dangerous pollution of the water in the higher interests of the public health.

The work is a welcome addition to public health literature, and it is sure to meet with general appreciation. It should appeal to a wide circle of readers, for it is written in a manner which presents a most important subject in a clear and intelligible light to everyone.

Nature Study: Realistic Geography. Model based on the 6-inch Ordnance Survey. Designed by G. Herbert Morrell, M.A. (London: Edward Stanford.) Price 3*s.*

THIS is a model of the country round Streatley-on-Thames, constructed by cutting out pieces of cardboard according to the contour lines and placing them one above another in the positions shown by the map. Spare pieces of cardboard, on which the contour lines are printed, ready for cutting out to make a second model, are enclosed in a portfolio along with the first. The construction of models of this kind has been carried out for some years in a number of schools, both in this country and abroad, but the general experience seems to be that, like the trigonometrical survey of the school and playground, and other similar devices, the time necessary to carry them out is too much for the value of the results obtained. The use of Mr. Morrell's model undoubtedly saves some time, inasmuch as the contour lines are already traced, but we suspect that the tracing of the contour lines is really the most important part of the exercise. But anything which assists in familiarising British school children with the ideas of contour lines and surfaces is to be welcomed; it is astonishing how many children who are familiarly acquainted with isobars, isothermals and "iso-" lines of all sorts have scarcely heard of contour lines, and it is not too much to state that the failure to present the conception of a contour or "iso-" line as the intersection of a surface with the surface of the earth is almost the fundamental defect in our teaching of advanced physical geography. Apart from its application to the purpose for which it is immediately intended, Mr. Morrell's model should be of value to teachers for demonstration.

A Junior Chemistry. By E. A. Tyler, B.A. Pp. viii + 228. (London: Methuen and Co., 1902.) Price 2*s.* 6*d.*

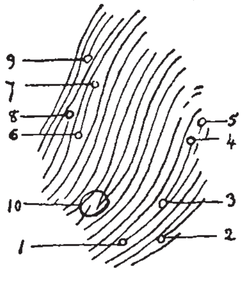
THE author's primary object seems to be to enable boys to present themselves successfully for the examinations in chemistry held in connection with the Oxford and Cambridge locals and similar examinations. He recognises the existence of a better way of teaching his subject than the one he adopts, and urges in extenuation of his procedure the inadequate provision made for practical science in most secondary schools and the small amount of time devoted to science in them. Mr. Tyler expresses the hope that the book he has written will enable boys in ordinary schools "to acquire, as far as possible, a scientific knowledge of chemistry," but he does not seem to understand that science is not properly included in the curriculum because of the information its study imparts, but rather as a means of developing a habit of mind. Unless chemistry is studied experimentally, and is made to train the pupil to observe and to reason from his observations, it has no right to a place on the school time-table. Before the pupil has been set to study the preparation and properties of a few simple substances, and from his own deductions taught to discover the laws of chemical combination, Mr. Tyler tries to explain to him the atomic theory, Avogadro's law, compound radicals, and other theoretical considerations. Though the author understands well enough all the chemistry a boy need learn at school, he does not quite appreciate why men of science desire such subjects as chemistry to be introduced into school work.

LETTERS TO THE EDITOR.

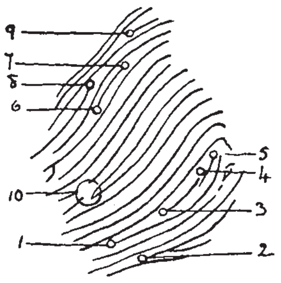
[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

Finger Print Evidence.

BY the courtesy of authorities in Scotland Yard, I have just received duplicates of two enlarged photographs (on slightly different scales). These photographs were lately submitted in a court of law to prove the identity of *a*, the mark left on the window frame of a house after a burglary had been committed, with *b*, the impression of the left thumb of H. J., a criminal then released and at large, whose finger prints are preserved and classified in Scotland Yard. I wished to show the resemblance between *a* and *b* by the method described in my "Decipherment of Blurred Finger Prints," believing that to be the readiest way of explaining to a judge and jury the nature of the evidence about to be submitted to them. I send the results. The questions of the best mode of submitting evidence and of the amount of it that is reasonably required to carry conviction deserve early consideration, for we may have a great deal of it before long. It is as a contribution towards arriving at a conclusion that I send the enclosed. I should say that in the above-mentioned book, each pair of impressions was printed in triplicate and on a still larger scale than these. One of the three was untouched, the second had lines drawn like those in the figure, down the axes of the ridges, the third had the lines and numbers and nothing else, just as in the figure. The attention of the judge and jury could be easily directed by counsel to whatever pair of corresponding points he might desire, by reference to their common number on the chart. Without some such guidance it would be extremely difficult to do so, for persons unaccustomed to finger prints are bewildered by the maze of their lineations.



a.



b.

Certain more or less faint lines run across *a* that seem to have been made with the brush when painting the window frame. They seriously interfere with the lineations just above No. 5 and to the right of it. No. 5 is itself so far affected by them that I do not attach full weight to it as a point of reference. But accurate comparison is possible at nine other points, all of which are marked, and a close agreement will be found between every pair of them as well as in the number of intervening ridges.

FRANCIS GALTON.

[The prints have been too much reduced from the tracings I sent, to be quite clear. Thus unless a lens be used, No. 2 in *b* will probably be misinterpreted.]

Remarkable Fossil Oysters from Syria.

IN examining a series of more than one hundred specimens of *Ostrea* (*Exogyra*) *flabellata*, Goldfuss, from the Middle Cretaceous of Lebanon, I was struck with the marked reproduction in the free upper valves of the figures of other shells to which the lower valves have been attached. These specimens were all collected in the same place, a hill near Bḥamdûn, Mount Lebanon, Syria. They have been freed by weathering from a soft marly rock exceedingly rich in fossils. Specimens of Ostrea, Plicatula, Pecten and Anomia have the shell well preserved. Many others, including species of Cardium, Trigonia, Corbula, Isocardia, Cytherea, Leda, Nucula, Cerithium, Alaria, Melo, Pterocera, Turritella, Natica and others are preserved only as casts. Consequently the shell to

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which the oyster was attached has usually disappeared, except in those cases in which it was attached to one of its own species. More than half of the specimens have the two valves united and free from adhesions, so that they are capable of exhibiting the phenomenon referred to. More than nine-tenths of these show more or less clearly in the upper valve the figure impressed upon the lower valve by the shell to which the latter adhered.

In most cases this is the figure of a part of the outer surface of a bivalve shell. In a few it is the inner surface of a bivalve shell. In one oyster the figure of part of a specimen of *Cerithium magnicostatum*, Conrad, is clearly shown above and below; in another, *Cerithium libanoticum*, Fraas, with a much better outer lip than is usually found in specimens of the original shell. In two cases the internal cast of a small Cerithium, together with some of the matrix, still adheres to the lower valve of the oyster, while its external form, lost below, is beautifully reproduced upon the upper valve.

In two very striking instances, the lower valve of the oyster shows the impression of a bivalve shell with spiny ribs, while a reproduction of these same spiny ribs appears in high relief upon the upper valve. These reproductions in the upper valve of figures impressed upon the lower valve might be supposed to result from the close contact of two valves when both valves were thin and small, and might be expected to be confined to the region of the umbo in well-grown specimens; but in all cases in which the oyster has been attached by a large portion or all of the lower valve, the impression is reproduced upon a correspondingly large portion of the upper valve. In view of the fact that in most specimens the shell is from 1·5 to 2 cm. thick, and, further, that internal surfaces when exposed show no traces of these external markings, it is noteworthy that the markings should extend over so much of the upper surface instead of being confined to the umbonal region.

ALFRED ELY DAY.

Syrian Protestant College, Beirût, Syria, September 22.

THE peculiar phenomenon referred to in the above letter is well known to occur among Secondary fossils, and has been fully explained by Prof. J. W. Judd in the *Geological Magazine* for 1871, p. 385, where several figures of Oolitic forms are given in illustration. The same peculiarity is also seen in certain oysters from the Lias. The thin growing edge of the shell adapts itself to the inequalities of the surface upon which it grows; the upper valve, being also thin, reproduces the form of the lower valve. The shell becomes thickened by additional layers on the inside, which thus gradually loses the markings that are retained upon the outer surfaces. E. T. N.

Refractivities of the Inert Gases.

A RELATION appears to exist between the refractivities (μ-1) of the inert gases of the atmosphere and that of hydrogen, which, so far as I am aware, has hitherto escaped attention. The following figures show that, taking the refractivity of hydrogen as 1, the refractivities of the other gases are very nearly in the proportion of ¼, ½, 2, 3 and 5.

By far the largest divergence is in the case of helium. This gas, as I am informed, is difficult to purify from the admixture of the heavier gases, so that a perfectly pure specimen would probably give a better result. Even if the relation to hydrogen is fortuitous, the ratios of the refractivities of the other five gases to one another are sufficiently interesting.

Refractivities[1] observed (Air=1).		Ratio to H.	Calculated from H=0·4733.	Error per cent.
Helium	0·1238	¼	0·1183	−4·4
Neon	0·2345	½	0·2366	+0·9
Hydrogen	0 4733	1		
Argon	0·968	2	0·9466	−2·2
Krypton	1·450	3	1·420	−2·0
Xenon	2·364	5	2·367	+0·1

CLIVE CUTHBERTSON.

9 York Terrace, Regent's Park, N.W., October 10.

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[1] Ramsay and Travers, *Phil. Trans.*, vol. cxcvii. A, 1901, p. 47.

Trade Statistics.

IN his reply to my letter (October 2, p. 550), Dr. Mollwo Perkin brings forward fresh figures, apparently proving an enormous decline in British industry since 1870–74. This, however, is but to repeat Mr. Levinstein's mistake in an aggravated form. The Franco-Prussian war in 1870 checked manufacturing abroad for a twelvemonth, and in 1870–74 there was a heavy demand for British iron and coal at excessively high prices. That period, as is well known, is useless for comparisons of British and German export trade.

It is true, as Dr. Perkin points out, that the general rate of increase of exports (*i.e.* of their total values irrespective of the number of producers) has, in the last twenty years, been very slow in this country, rather rapid in Germany and very rapid in the United States.

But if we reckon per head of population, we get the following (from the Board of Trade "Memorandum," "Cd. 1199"):—

Annual Exports ("Special") per head of Population.

Average of period.	United Kingdom.	France.	Germany.	United States.
	£	£	£	£
1875–79	6·00	3·75	3·15	2·81
1880–84	6·66	3·67	3·43	3·30
1885–89	6·18	3·46	3·27	2·59
1890–94	6·15	3·57	3·14	2·95
1895–99	5 97	3·73	3·36	2 92

These figures are distinctly reassuring. They must not be used as an excuse for laxity in education or the application of science to manufacture, but they ought to allay unreasonable pessimism.

The slight decline per head in the British exports (as measured in money, not in commodities) would be a rather unsatisfactory feature if the export trade were our chief trade and chief source of income. Dr. Perkin perhaps thinks that it is, for he translates Mr. Levinstein's "foreign trade" into "trade." But the gross value of the export trade (280 or 300 millions per annum), large as it is, is small compared with the total national income, recently estimated by Sir Robert Giffen at 1500 millions sterling, while the income-tax assessments indicate that it is increasing faster than the population (*Times*, May 23, 1901). This enormous income is, of course, chiefly made up of the value of goods produced and consumed within the country, constituting the internal trade as distinguished from the foreign trade. From this point of view a close scrutiny of export statistics appears to be unnecessary, and may easily be misleading.

Unfortunately, we have no adequate statistics of total production. The figures for pig iron which Dr. Perkin gives are to the point, and the progress of our two great rivals is here very striking. But the pig-iron manufacture accounts for less than 3 per cent. of our national earnings. F. EVERSHED.

Kenley, Surrey, October 10.

Material for Natural Selection.

Verbesina exauriculata[1] is an evil-scented but handsome herbaceous plant with broad orange rays, very abundant in the town of Las Vegas, New Mexico. My class in biology has been making a study of the variations in the number of rays in the heads of this plant, and in so doing we took occasion to compare two sets, from the eastern and western parts of the town respectively. The result was as follows, calling these sets A and B respectively:—

Number of Rays.	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21
Number of heads, set A.	—	—	7	7	31	63	96	30	19	13	7	9	7	3	2.
Number of heads, set B.	1	6	10	19	32	73	84	25	12	5	2	1	—	1	—.

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[1] *Verbesina encelioides exauriculata*, Robinson and Greenman, *Proc. Amer. Acad.*, May, 1899, p. 544. Notwithstanding the name of this northern type, the petioles of the upper leaves are commonly strongly auriculate.

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